

Witness Biography and Written Testimony for the House Committee on Science, Space, and Technology, Subcommittee on Investigations & Oversight, hearing:

# Paper Mills and Research Misconduct: Facing the Challenges of Scientific Publishing

Witness: Chris Graf, Chair, Governance Committee, STM Association Integrity Hub, and Research Integrity Director, Springer Nature

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## Contents

<b>Biography</b>	<b>2</b>
<b>Written Testimony</b>	<b>3</b>
Introduction: Some things are better done together, research integrity is one	3
Let me start by presenting background	3
Challenges to research integrity: Errors, misconduct and fraud	4
Scale of fraudulent publications from paper mills	5
Continued investment in publishing technology is part of the answer	6
Action is needed beyond the publishing sector	7
Further reading	7

## Biography

Chris Graf is the Research Integrity Director (a position he has held since September 2021) and Leader of the Editorial Excellence Team (since January 2022) at Springer Nature. In these roles, he is in charge of leading the continued development and implementation of Springer Nature's research integrity strategy, leading a 20-person team accountable for upholding the highest standards for research integrity in all of Springer Nature's publications. Chris also serves the publishing sector with a voluntary role at the STM Association, the global trade association for academic and professional publishers, where he chairs a committee of senior publishing industry executives overseeing governance of the STM Integrity Hub. The STM Integrity Hub is an initiative launched early 2022 to equip the publishers (and the scholarly communication community) with data, intelligence, and technology to protect research integrity.

Chris has decades of experience in the intersection of scientific publications, academic research, and the ethics of the scientific peer review process. He was a long-time volunteer and is a continuing advocate for the Committee on Publication Ethics ("COPE"), serving in a number of positions from 2005 to 2020 including treasurer, vice-chair, and co-chair, and has worked in a number of other positions at the intersection of research integrity and publishing. He has served on the World Conference of Research Integrity programme committee since 2017. He has written widely on the topic of publishing and academic integrity in the peer review process, including published articles on minimum report standards for life scientists and on how different models of peer review impact final research quality.

Chris started at Wiley in 2004, serving as a Publisher and then an Associate Editorial Director in clinical medicine. He published Wiley's first edition best practice guidelines on publication ethics. In 2011, he was promoted to serve on secondment as the Editorial Director for Health and Life Sciences in Australia. On his return to the UK in 2014 he worked in Wiley's innovation team as the Digital Learning Director and Learned Society Partnership Director, from 2014-2017. His time at Wiley continued with him becoming the Director of Research Integrity in the Wiley Open Research team, a post he held from 2017 to 2021. Chris began his career as an Editor for various publications and holds a bachelor's degree in Chemistry.

## Written Testimony

### Introduction: Some things are better done together, research integrity is one

Thank you, Chairman Foster, Ranking Member Obernolte and esteemed members of the committee for inviting me to testify today and the opportunity to share with you an overview of the work we do to safeguard research integrity.

My name is Chris Graf. I am the Research Integrity Director at Springer Nature and also serve as the Chair of the Governance Committee for the STM Association Integrity Hub.

The written testimony below sets out how the research publishing sector is facing one of its current challenges, namely the challenge of paper mills and research misconduct. The testimony concludes that the opportunities exploited by paper mills are created 'upstream' where research is done. While publishers can and are doing more to stop papers generated by paper mills, other actors also have a responsibility, including the organizations that fund and employ researchers. That's where the solution lies, in a broad coalition of those who are able to make change happen. Some things are better done together, research integrity is one.

### Let me start by presenting background

- **Trust in science remains strong.** 48% of Americans have a great deal of confidence in the scientific community per NORC's 2021 survey (General Societal Survey, [NORC at the University of Chicago](#)). The NORC survey and another from Pew both suggest this may be trending downwards since COVID, and could depend on the respondent's political alignment ([Pew Research Center](#)). Outside the US measures of public trust in scientists and professors are similarly high at +70% net trust, compared with nurses who score +91% and advertising executives who score -59% (UK 2021 Trust in professions survey, [IPSOS MORI](#)).
- **5,000,000 peer reviewed scientific papers** were published in 2021 ([Dimensions](#)).
- **630,000 COVID papers** are in the WHO database for global literature on coronavirus disease ([World Health Organization](#)).
- **A scientific paper is retracted when serious and unaddressable concerns are identified** about the reliability of the scientific content presented in a paper. These concerns range from honest but fundamental errors (Retractions: A clean slate, [Nature](#)), via questionable or misleading research practices, to misconduct including that promoted by 'paper mills'.

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- **Only 4 in 10,000 peer reviewed scientific articles are retracted** after publication. Sometimes this happens months later, sometimes years (Rethinking retractions, [Science](#)). We consider this to be an indicator of significant and successful investments in quality made by researchers and by publishers.
- **About 300 COVID papers have been retracted** (similar to the general rate of about 4 in 10,000 cited above) ([Retraction Watch Database](#)).
- **Publishers, with other stakeholders, have been developing and sharing resources** about managing honest but fundamental mistakes, as well as questionable practices, misconduct, and systematic manipulations for some years (Systematic manipulation of the publication process, [COPE](#)).
- **Publishers continue to invest in screening for integrity**, including routine checks for plagiarism as well as for other indicators of ethics and quality (like disclosures of conflicts of interest, description of ethics committee approval and funding sources). Both require investments in a mixture of technology and operations. Some publishers are beginning to roll out screening for newer concerns that indicate paper mills, like image manipulation (The fight against fake paper factories, [Nature](#)).
- **Paper mills are a relatively new and growing threat** in the research and publishing community. Evidence suggests they are operating with relative freedom. (Paper mills Research Report, [COPE/STM Association](#)).
- **Paper mills cause real damage.** (Tackling paper mills and bogus research: Some things are better done together, [Springer Nature](#)).
- **Legitimate researchers benefit from a largely trust-based system.** Solving the paper mill problem without making publishing harder or less trust-based for the vast majority of legitimate researchers is the challenge. (STM Integrity Hub, [STM Association](#)).

### Challenges to research integrity: Errors, misconduct and fraud

Paper mills are fraudulent organizations that profit by systematically and duplicitously manipulating the systems and processes used to write and publish science. The causes of, and solutions to, the harm to the scientific record caused by paper mills are being discussed by stakeholders across the research publishing sector. Solving the paper mill problem without making publishing harder or less trust-based for the vast majority of legitimate researchers is the challenge.

Research publishers represented by the STM Association (the global trade association for academic and professional publishers) are concerned by the increase in research integrity issues in general, and particularly with paper mills. Paper mills are using increasingly advanced technologies to fabricate, plagiarize, and manipulate text, images, and research data. Paper

mills operate systematically and at scale, but misconduct by individual researchers (for example image manipulation or data fabrication) is another concern. Unwitting errors by researchers likewise pose a problem for the integrity of the scholarly record, but in and of themselves are not malicious (these are sometimes referred to as questionable research practices). Each of these areas of concern potentially undermines trust in science. They place a burden on publishers, editors, and peer reviewers. The STM Association and many of its members are concerned about the dynamics that drive these behaviors.

### Scale of fraudulent publications from paper mills

The STM Association and COPE (Committee on Publication Ethics, a UK charity that brings together all those involved in scholarly research and its publication to strengthen integrity) commissioned a study of data submitted from a variety of leading publishers to get a sense of the scale of the problem. This study was published as a Research Report in June 2022 (<https://publicationethics.org/files/paper-mills-cope-stm-research-report.pdf>). The results show that the submission of suspected fake research papers with fake authorship is growing and threatens to overwhelm the editorial processes of some journals.

As part of the STM/COPE study, data on over 53,000 papers was analyzed. This data was shared by six publishers and spans a wide range of research disciplines. Overall the percentage of suspect papers being submitted to the journals that were investigated ranges from 2 to 46% (please note that these journals do not constitute a representative sample, and the findings are not generalisable). The analysis shows that most journals included in the analysis saw 2% suspected fake papers submitted and then, for journals where paper mills have been successful in getting papers accepted, those journals see a sharp increase in suspect submissions.

The Research Report identifies two areas of work publishers are currently undertaking:

- Pre-publication submission review: Tools and processes are increasingly being used to identify suspect papers early in the submission process.
- Post-publication review and retraction: There are a number of ways that a journal can identify a suspect paper already published, and standard processes to follow thereafter.

Interviews with a range of stakeholders including publishers, research investigators and journalists (including at *Retraction Watch*) show what we would characterize as a shared level of concern. There is a realization that all stakeholders need to work together to find long-term solutions. The Research Report ends with a call for collective action, and makes 5 Key Recommendations:

1. Engagement with institutions and funders
2. Continued investment in tools to detect potential paper mill papers
3. Educational exercise for editors and editorial staff
4. Investigation of protocols to impede paper mills

5. Review of the retraction process to take account of the unique features of papermill papers

### Continued investment in publishing technology is part of the answer

Publishers, with other stakeholders, have been developing and sharing resources about managing honest but fundamental mistakes, as well as questionable practices, misconduct, and systematic manipulations for some years

<https://publicationethics.org/resources/flowcharts/systematic-manipulation-publication-process>.

The STM Association and many of its members believe that reliable, state-of-the-art technology solutions can play an important role in addressing these challenges by flagging possible concerns before publication to support the editorial decision-making process. This allows publishers to prevent this material from entering the scholarly record. For this reason, in early 2022 STM launched the STM Integrity Hub <https://www.stm-assoc.org/stm-integrity-hub/>. The mission of the Hub is to equip the publishers and the scholarly communication community with data, intelligence, and technology to protect research integrity. The Hub will do that in three ways:

1. Fostering the sharing of intelligence and knowledge: For example, sharing experiences that publishers have in identifying papers that are produced by paper mills.
2. Building policies and frameworks: Everything we do in terms of safeguarding research integrity has to be firmly embedded in legal and policy frameworks, where we work closely with editorial and legal teams, as well as with organizations like COPE.
3. Building a platform that allows publishers to provide content to detect patterns across publishers in a safe and confidential way, but also to easily integrate third-party screening tools in their workflows that focus on specific questionable research practices, e.g. image manipulation.

Publishers and publishing technology providers have invested in systems to detect potentially problematic cases for years. For example, publishers and journals routinely check for plagiarism using investments they make in the publisher-initiated non-profit organization CrossRef, with the technology provider iThenticate, and integrated with most editorial software systems provided by publishing technology companies and paid for by publishers. Some larger publishers have also started to invest in development of their own technologies and operations to counter new challenges, for example challenges in image manipulation. However, the new and changing techniques adopted by paper mills require ongoing investments, and the significant financial burden is challenging to larger publishers and prohibitive to smaller ones. Additionally, working as individual publishers does not facilitate knowledge sharing. This is why the collaboration under the STM Integrity Hub is critical. It creates the organization needed for collective investment and effective action, and makes the burdens manageable.

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Currently, over 20 publishers are actively participating in the Integrity Hub including commercial publishers, learned societies and university presses, representing all academic disciplines and both smaller, mid-sized and larger organizations. This reflects the collaborative nature of the initiative, and the strong commitment to maintain the integrity of science.

## Action is needed beyond the publishing sector

To close, a final observation. The opportunities exploited by paper mills are created 'upstream' where research is done. While publishers can and are doing more to stop papers generated by paper mills, other actors also have a responsibility. Included among these other actors are the organizations that fund and employ researchers, who create research incentives and environments. The first Key Recommendation from the STM/COPE Research Report is to engage with institutions and funders, and so take a system-approach to the paper mill problem. That's where the solution lies. Some things are better done together, research integrity is one.

## Further reading

[Tackling paper mills and bogus research: Some things are better done together](#), *Springer Nature*, 28 April, 2022

[Want research integrity? Stop the blame game](#), *Nature*, World View, 24 November 2021

[What a massive database of retracted papers reveals about science publishing's 'death penalty'](#), *Science*, 25 October 2018

[Research integrity is much more than misconduct](#), *Nature*, Editorial, 3 June 2019

[Systematic manipulation of the publication process](#), *COPE*, February 2019 updated December 2021

[We need to talk about systematic fraud](#), *Nature*, Comment, "Software that uncovers suspicious papers will do little for a community that does not confront organized research fraud", says Jennifer Byrne, 6 February 2019

[Swedish research misconduct agency swamped with cases in first year](#), *Nature*, news article, 13 September 2021

[The fight against fake-paper factories that churn out sham science](#), *Nature*, news feature, 23 March 2021

[China's clampdown on fake-paper factories picks up speed](#), *Nature*, news article, 1 October 2021

[How to investigate allegations of research misconduct: a checklist](#), *Retraction Watch*, 8 January 2019

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[Revealed: The inner workings of a paper mill](#), *Retraction Watch*, 20 December 2021

[How to find evidence of paper mills using peer review comments](#), *Retraction Watch*, 21 February 2022

[20 ways to spot the work of paper mills](#), *Retraction Watch*, 9 February 2021

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